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Inventors: Ogata et al.

Title: Metal Halide Lamp

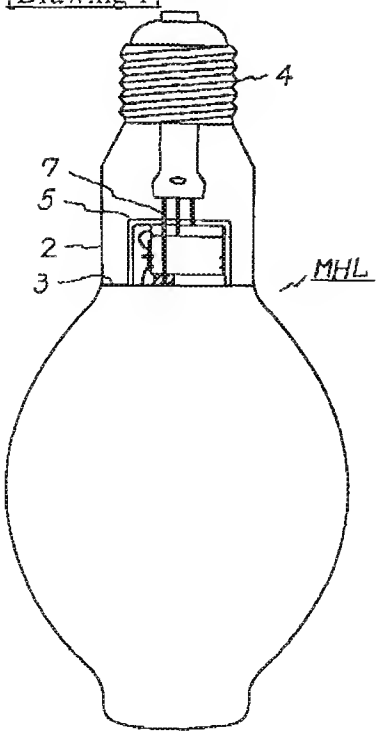
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The front view showing one embodiment of the metal halide lamp of this invention
[Drawing 2]The front view showing the state where the fluorescent substance layer was similarly removed
[Drawing 3]The graph which shows the relation between the rated lamp power in one embodiment of the metal halide lamp of this invention, and bulb wall loading with it of a conventional example
[Drawing 4]The circuit diagram showing the light circuit of the electrical connection of the inside in one embodiment of the metal halide lamp of this invention, and the high-pressure discharge lamp of this invention
[Drawing 5]The graph which shows spectrum spectrum distribution with a wavelength of not less than 410 nm of luminescence of the whole lamp in Example 1 of the metal halide lamp of this invention
[Drawing 6]The chromaticity diagram showing the chromaticity in Example 1 similarly
[Drawing 7]The graph which shows ultraviolet area spectral distribution with a wavelength [in Example 1 of the metal halide lamp of this invention] of 280-380 nm
[Drawing 8]The chromaticity diagram showing the chromaticity in Example 2 of the metal halide lamp of this invention with it of a conventional example
[Drawing 9]The graph which shows distribution of the ramp voltage in Example 2 of the metal halide lamp of this invention, and the relation of total luminous flux with it of a transparent form
[Drawing 10]The chromaticity diagram showing the chromaticity in Example 3 of the metal halide lamp of this invention with it of a conventional example
[Drawing 11]The graph which shows distribution of the ramp voltage in Example 3 of the metal halide lamp of this invention, and the relation of total luminous flux with it of a transparent form
[Drawing 12]The graph which shows the relation of the total luminous flux to the rate of a compounding ratio of the fluorescent substance in one embodiment of the metal halide lamp of this invention
[Drawing 13]The graph which similarly shows the relation of the general color rendering index to the rate of a compounding ratio of a fluorescent substance
[Drawing 14]The graph which similarly shows the relation of the correlated color temperature to the rate of a compounding ratio of a fluorescent substance
[Drawing 15]The graph which similarly shows the relation of the chromaticity difference

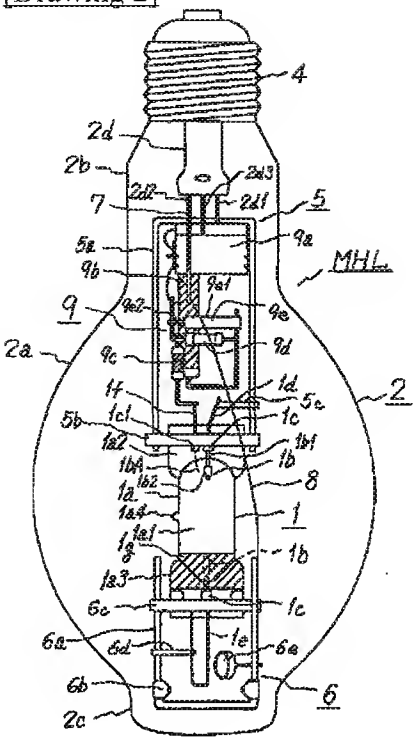
over the rate of a compounding ratio of a fluorescent substance
[Drawing 16]The graph which shows the spectrum spectrum distribution of the fluorescent substance layer used for the conventional spread type metal halide lamp
[Drawing 17]The graph which shows distribution of the ramp voltage in the conventional transparent form and a spread type metal halide lamp, and the relation of total luminous flux
[Drawing 18]The graph which shows ultraviolet area spectral distribution with a wavelength [in the conventional spread type metal halide lamp] of 280-380 nm
[Drawing 19]The graph which shows ultraviolet area spectral distribution with a wavelength [in the conventional transparent form metal halide lamp] of 280-380 nm
[Description of Notations]
1 -- Arc tube
2 -- Outer tube
3 -- Fluorescent substance layer
4 -- Cap
5 -- Top supporting structure
6 -- Lower supporting structure
7 -- Connected conductors
8 -- Connected conductors
9 -- Pulse starter
MHL -- Metal halide lamp

DRAWINGS

[Drawing 1]



[Drawing 2]



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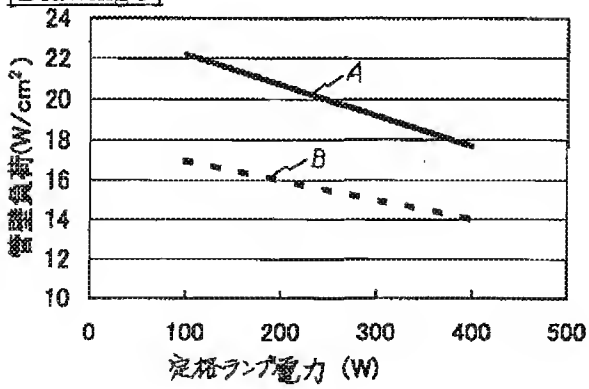

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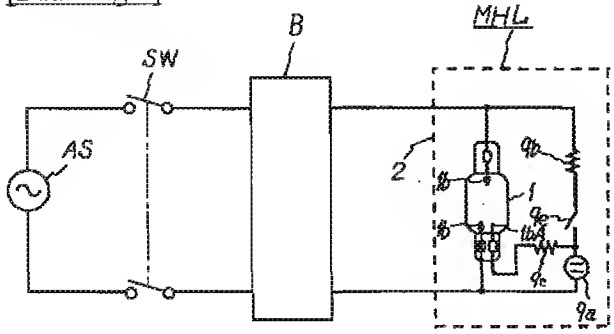

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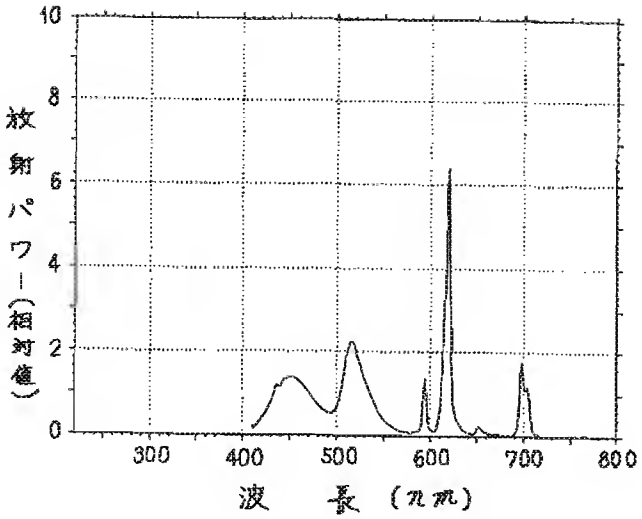

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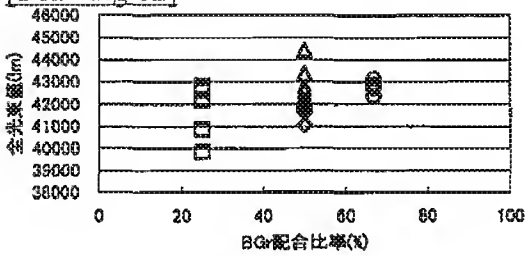

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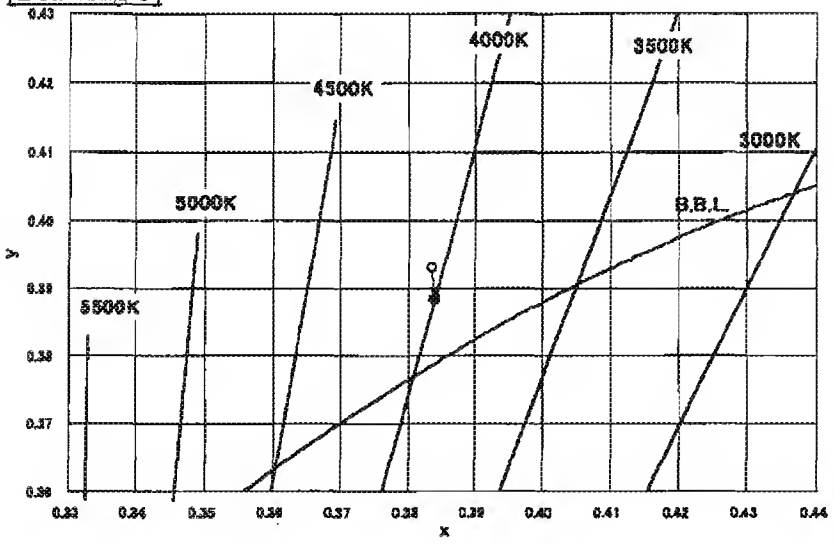

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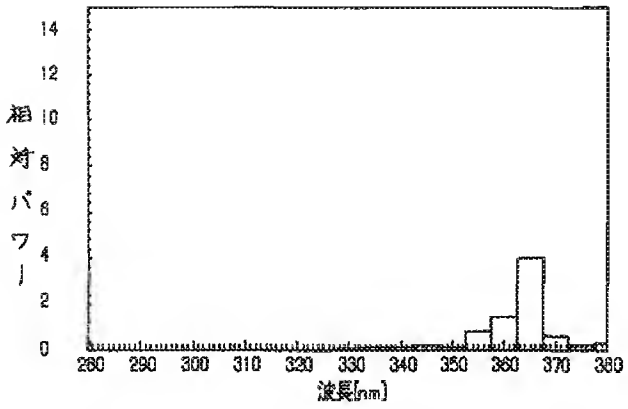

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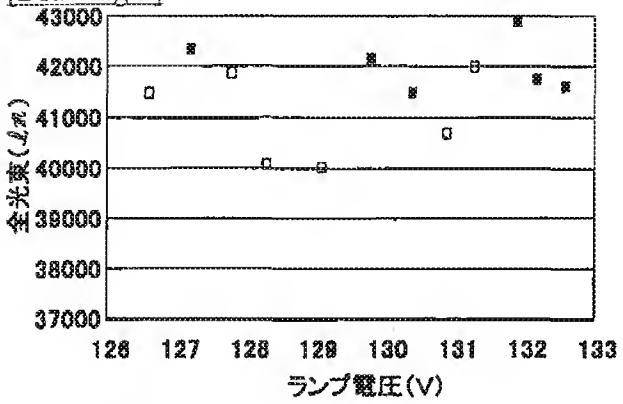

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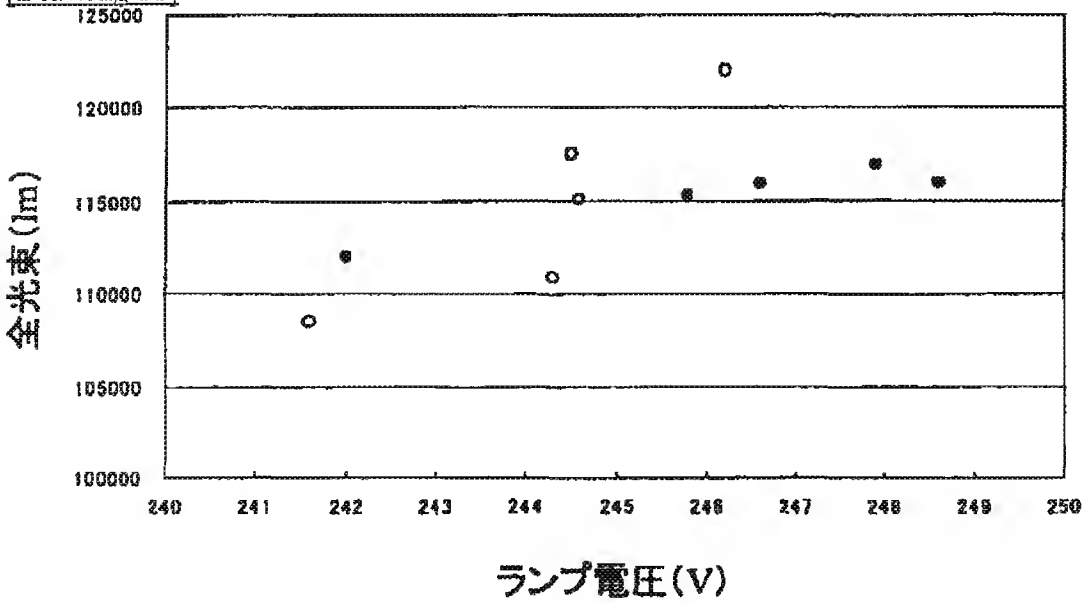

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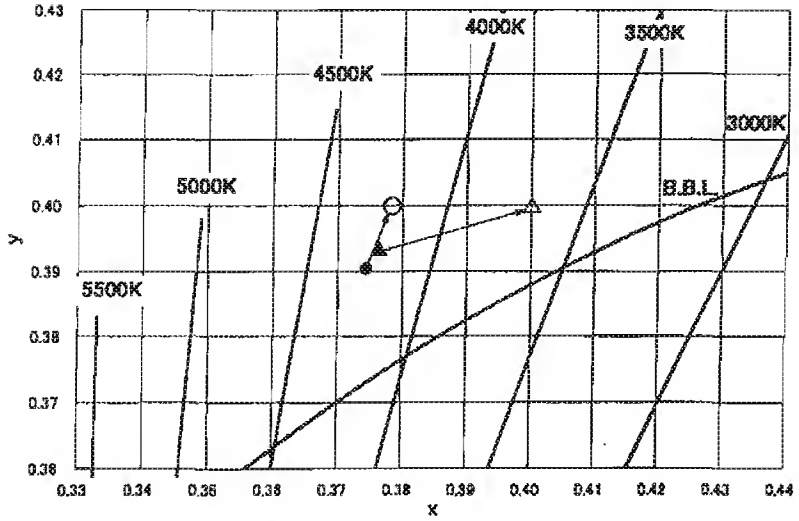
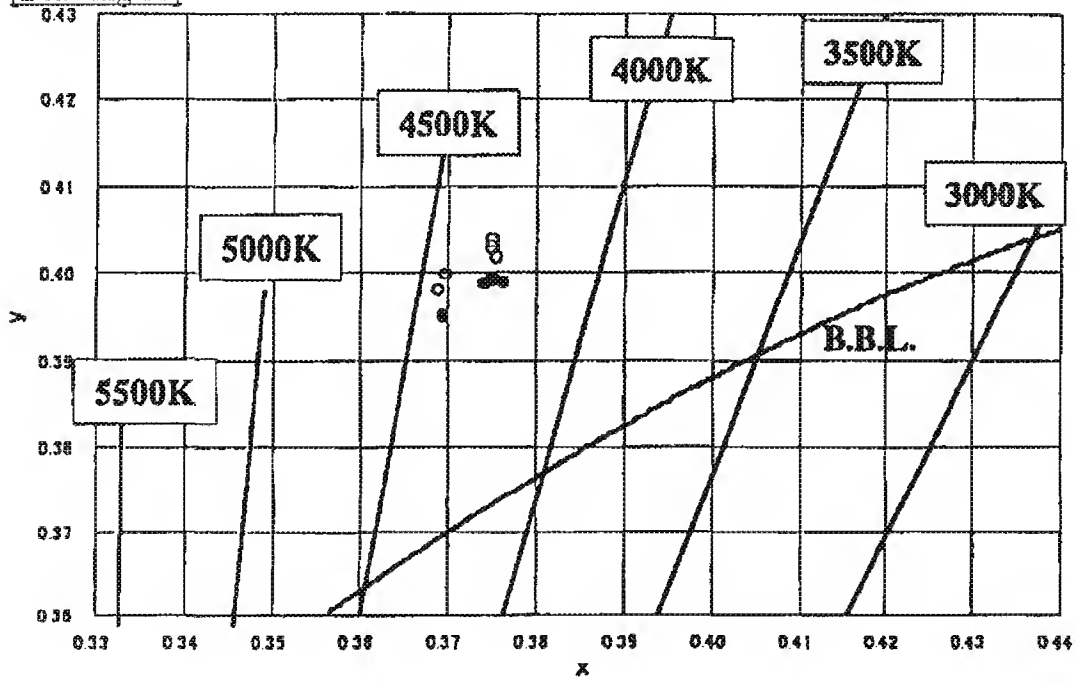
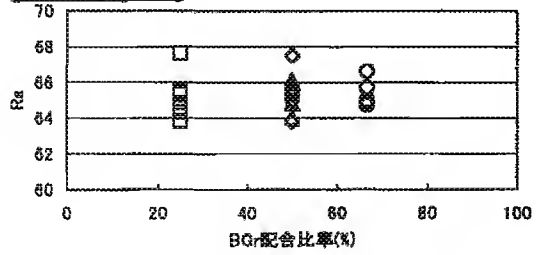


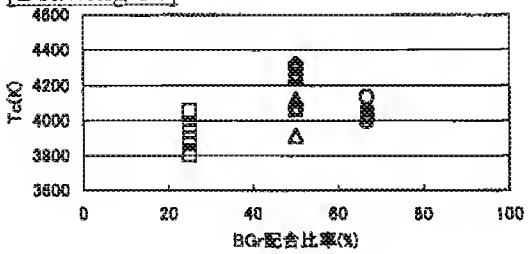
[Drawing 10]



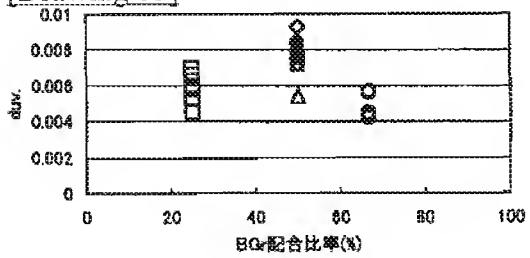
[Drawing 13]



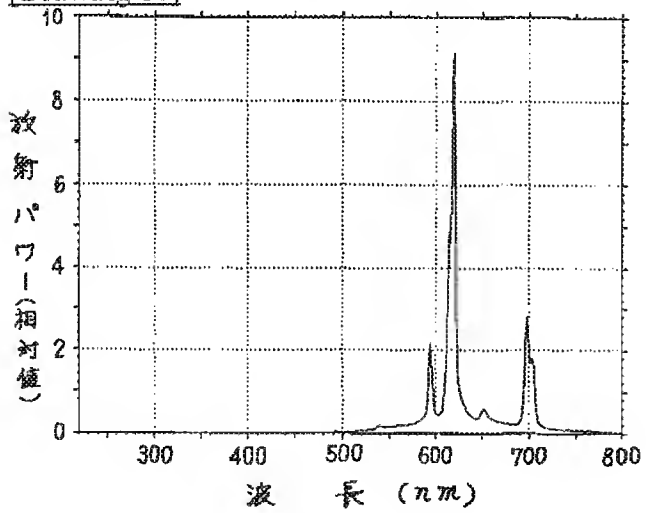
[Drawing 14]



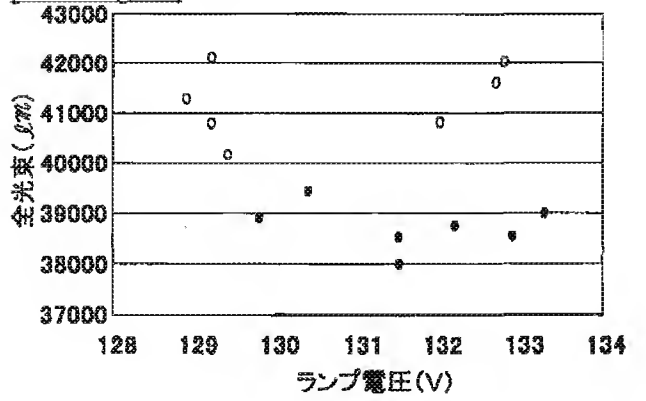
[Drawing 15]



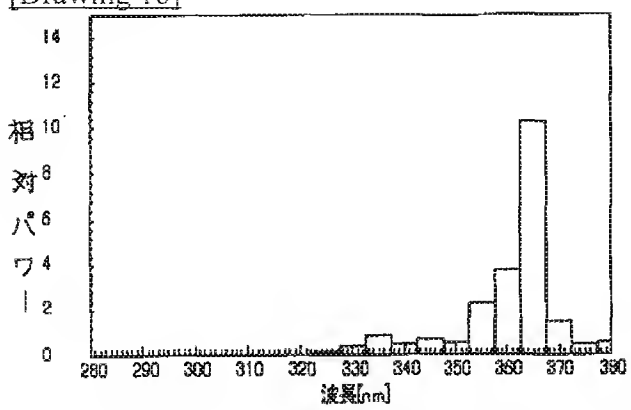
[Drawing 16]



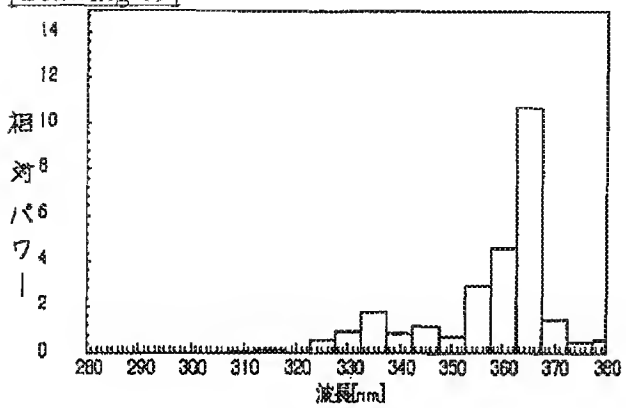
[Drawing 17]



[Drawing 18]



[Drawing 19]



DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the spread type metal halide lamp which equipped with the fluorescent substance layer the inside of the outer tube which stores an arc tube inside, and an outer tube.

[0002]

[Description of the Prior Art]In high lamp efficiency, the metal halide lamp has the feature of moreover being a high color rendering, and has spread widely. There are a transparent form and a spread type in a metal halide lamp. Since luminescence from an arc tube will go into eyes directly if the outer tube of the former which has stored the arc tube inside is transparent, and high condensing nature is obtained when [with a reflector] it is combined and used, but the outer tube is transparent, it may look very dazzlingly or may sense unpleasant. Since the inner surface of the outer tube is equipped with the

fluorescent substance layer and this fluorescent substance layer acts as an optical diffusion shell, the dazzle of the metal halide lamp can be weakening the latter.
[0003]The fluorescent substance layer used for the metal halide lamp of the conventional diffusion type, $YPVO_4$:Eu/$(SrMg)_3(PO_4)_2$Sn/SiO_2 is mixed at a rate of 57%/38%/5% (all are mass %), Since a fluorescent substance is excited by the ultraviolet rays emitted from an arc tube, light is emitted in the part light-spectrum distribution shown in drawing 13.
[0004]Drawing 16 is a graph which shows the spectrum spectrum distribution of the fluorescent substance layer used for the conventional spread type metal halide lamp. In a figure, a horizontal axis shows wavelength (nm) and a vertical axis shows radiant power (relative value), respectively.
[0005]Luminescence by a fluorescent substance layer has a main-light-emission peak in the wavelength of 590 nm, 620 nm, and 700 nm so that he can understand from a figure. For this reason, the color rendering properties of a high-pressure discharge lamp improve.
[0006]
[Problem(s) to be Solved by the Invention]however, the thing for which it has the fluorescent substance layer when it is the conventional metal halide lamp -- correlated color temperature -- 200-400 -- while becoming low about K, as shown in drawing 17, there is a problem that total luminous flux will fall about 5 to 10%.
[0007]Drawing 17 is a graph which shows distribution of the ramp voltage in the conventional transparent form and a spread type metal halide lamp, and the relation of total luminous flux. In a figure, a horizontal axis shows ramp voltage (V) and a vertical axis shows total luminous flux (lm), respectively. O sign shows a transparent form, - sign shows a spread type, respectively, and both of the specification of others except the existence of a fluorescent substance layer are the same. A transparent form does not have a fluorescent substance layer and the spread type is provided with the above-mentioned fluorescent substance layer.
[0008]Thus, by the existence of a fluorescent substance layer, there is a problem that correlated color temperature and total luminous flux will be different, for example, the inconvenience of ** which uses a transparent form and a spread type being intermingled not being made is produced in the same lighting facilities.
[0009]Also in the spread type provided with the fluorescent substance layer, and any of a transparent form, the conventional metal halide lamp has many amounts of ultraviolet radiation, as shown below. For this reason, there is a problem that it cannot use for the store lighting which dislikes ****** of goods.
[0010]Drawing 18 is a graph which shows ultraviolet area spectral distribution with a wavelength [in the spread type metal halide lamp shown in drawing 16] of 280-380 nm. The ultraviolet radiation illumination of this lamp is 22.3 microwatt/cm^2 / 1000lx.
[0011]Drawing 19 is a graph which shows ultraviolet area spectral distribution with a wavelength [in the conventional transparent form metal halide lamp] of 280-380 nm. The ultraviolet radiation illumination of this lamp is 25.3 microwatt/cm^2 / 1000lx.
[0012]Therefore, in order to have lessened ultraviolet radiation conventionally, glass of lead with small ultraviolet ray transmission, etc. needed to be used for the outer tube.
[0013]An object of this invention is for total luminous flux to provide the metal halide lamp of a transparent form and almost little [improve further, and correlated color temperature is almost equivalent, and] EQC or diffusion type of a color deviation.
[0014]This invention sets it as other purposes to, provide the metal halide lamp of little

diffusion type of the amount of ultraviolet radiation in addition.
[0015]
[Means for Achieving the Goal]A translucency discharge container in which discharge space is formed in an inside as for a metal halide lamp of an invention of claim 1, being sealed in a translucency discharge container -- the inside of discharge space of a translucency discharge container -- ******** -- even if small -- an electrode of a couple. And it is allocated including a halogenide of Na and Sc in an arc tube provided with a discharge medium enclosed in a translucency discharge container, an outer tube which stores; arc tube, and; outer tube at least, While an emission peak wavelength has red system luminescence (R) which is blue system luminescence (B) which is 450 nm, green system luminescence (G) which is 515 nm, and 585-605 nm, respectively, a radiant power ratio of each color system luminescence is characterized by providing a fluorescent substance layer with which it is satisfied of a lower type, and;.
[0016]B: In 0.5 to 1.1:1.0 to 1.7:G:R=1.0 this invention, and each following invention, unless it specifies in particular, a definition of term and a technical meaning are based on the next. A metal halide lamp of this invention possesses an arc tube, an outer tube, and a fluorescent substance layer at least, and is constituted. Hereafter, it explains for every component.
[0017]First, an arc tube is explained. An arc tube is constituted including an electrode and a discharge medium of a translucency discharge container and a couple at least.
[0018]A translucency discharge container consists of silica glass, and a sealed part is formed in both ends for sealing of an electrode. Sealing structure by the pinch sealing method, the decompression closing method, etc. can be used for a sealed part. Molybdenum foil is airtightly laid under the inside by sealed part of pinch sealing structure or decompression sealing structure, a end face of an axis of an electrode is welded to one end of molybdenum foil, and lead-in wire is welded to the other end.
[0019]A translucency discharge container permits that enclosure parts which surround the discharge space are desired shape, such as cylindrical shape, a globular shape, the shape of a spheroid, and fusiform.
[0020]A translucency discharge container may be which composition of both-ends closure and one end closure further again.
[0021]a couple is sealed in a sealed part of a couple of both ends [in / in an electrode / a translucency discharge container], or a single sealed part of one end at least -- an inside of a translucency discharge container -- ****** -- **** . If it requires, an auxiliary electrode can be sealed near one side among electrodes of the above-mentioned couple. Although structure in particular of an electrode is not limited, it is generally constituted by an axis of tungsten or doped tungsten, and coil of same material looped around the tip part.
[0022]The discharge medium must contain a halogenide of Na and Sc at least as a light-emitting metal. However, if it requires, in addition to the above-mentioned metal, it can add, a rare earth metal, for example, Dy etc., of Cs, Tl, and others, etc. By adding a halogenide of Cs, a going-out power surge is controlled and luminescent color and slight correlated color temperature also change as a result.
[0023]If I is used and generally requires as halogen, further optimum dose of Br(s) will be added. Rare gas can be enclosed as start-up gas and buffer gas.
[0024]Mercury can contain a discharge medium as buffer gas still more suitably.

[0025]Next, an outer tube is explained. An outer tube stores an arc tube airtightly to the inside, protects them mechanically, and maintains operating temperature of an arc tube in the range of desired. Inside of an outer tube is exhausted if needed, and can enclose a vacuum thru/or low pressure or inactive gas, for example, rare gas, and nitrogen. It can constitute using material, for example, hard glass, provided with suitable translucency for an outer tube, airtightness, heat resistance, and processability.
[0026]When closing an outer tube airtightly, any structure of piece closure and both-ends closure can be adopted by request. "Single sealed" means structure blockaded without forming a sealed part by pinch sealing etc. only in one end of an outer tube and the other end's forming a sealed part. On the other hand, "both-ends closure" means structure where a sealed part by pinch sealing etc. is formed in both ends of an outer tube.
[0027]Inside of an outer tube is exhausted if needed, and can enclose a vacuum thru/or low pressure, or inactive gas, for example, rare gas, further again.
[0028]A fluorescent substance layer is explained. A fluorescent substance layer should just be allocated inside an outer tube, therefore while an inner surface of an outer tube, an inner surface of an outer tube, and an arc tube, it can allocate a cylindrical barrel, and it can form it in the wall surface. a case where a fluorescent substance layer is formed in an inner surface of an outer tube -- a fluorescent substance layer -- an outer tube -- it may form over the whole mostly -- it may carry out, and a head and/or the neighborhood of a neck part may be left and formed in part.
[0029]Next, when a fluorescent substance layer is excited by ultraviolet rays with a wavelength of 400 nm or less which penetrated an arc tube, While an emission peak wavelength has red system luminescence (R) which is blue system luminescence (B) which is 440-460 nm, green system luminescence (G) which is 505-525 nm, and 585-605 nm, respectively, luminescence that a peak ratio of radiant power of each color system luminescence comes in a prescribed range is produced. Each color system luminescence and the subsequent numerals (B), (G), and (R) are notations used for convenience, in order to identify colored light by dividing into three relatively, therefore they do not mean in colored light accuracy. And even if colored light is above-mentioned wavelength within the limits, it changes according to the wavelength.
[0030]When a peak ratio of radiant power of each color luminescence sets it of R to 1 in emission-spectrum distribution of a fluorescent substance layer, B is 0.5-1.1 and G is 1.0-1.7. The 1st fluorescent substance that produces luminescence of a blue-green system which has a light emission peak in wavelength of 440-460 nm, and 505-525 nm, A peak ratio of the above-mentioned radiant power can be easily obtained by using for wavelength of 585-605 nm the 2nd fluorescent substance that produces luminescence of a red system which has a light emission peak at a rate of 1:1 thru/or 2:1, and forming a fluorescent substance layer. In this case, it may be the single fluorescent substance layer which mixed the 1st and 2nd fluorescent substances, and may be the composition of having piled up a fluorescent substance layer which consists of the 1st fluorescent substance, and a fluorescent substance layer which consists of the 2nd fluorescent substance.
[0031]In order to measure a peak ratio of radiant power of each luminescent color of a fluorescent substance, it is based on the following methods. Namely, put phosphor powder under test into a heat-resistant data stand provided with a shallow crevice, and ambient air temperature is heated in the atmosphere at 230 ** about temperature of a

fluorescent substance layer arranging position of a metal halide lamp, and equivalent, The wavelength 254 and 312 and 365-nm ultraviolet rays are taken out from luminescence of a pen form mercury lamp (rated ultraviolet-ray-intensity 4400 microwatt/cm ^{2} in ordinary temperature) with a light filter which cuts wavelength of not less than 400 nm, and a fluorescent substance is irradiated. And a spectrum of fluorescence generated from a fluorescent substance is measured with a spectroscope at the moment. As a result, a peak ratio of radiant power of each color luminescence is judged by a spectral distribution curve obtained. Visible light generated from the 1st and 2nd fluorescent substances shall permit that visible light occurs not only when generating in above-mentioned wavelength within the limits but out of the above-mentioned wavelength range. And it may be a case where a main peak exists out of the above-mentioned wavelength range, and a substitute peak is produced in above-mentioned wavelength within the limits.

[0032]It is permitted that add to a fluorescent substance and particles, such as a metallic oxide, for example, a silica dioxide etc., are contained in a fluorescent substance layer further again. About size smaller single or more figures than mean particle diameter of a fluorescent substance particle of mean particle diameter of a metal oxide particle in this case, for example, 0.3 micrometer, is good so that it may adhere to the circumference of a fluorescent substance particle. Thereby, a fluorescent substance layer adheres easily stably.

[0033]Other composition is explained. In addition to composition of explanation, each composition shown below if needed can be added selectively above.

1 Generally a stabilizer cheap about composition fitted to a cheap stabilizer is small, and its secondary voltage is low so that a mercury-vapor lamp stabilizer may see. In order to constitute a high-pressure discharge lamp so that a cheap stabilizer may be suited, it is necessary to make a lamp power-factor into a to some extent high value. A stabilizer in which this does not make secondary voltage not much high is required in order for there to be concern of arc going out in a life and to conquer this. In this invention, since Sc and Na are used for a light-emitting metal of an ionization medium as the main ingredients like previous statement, a lamp power-factor can be made high and a high-pressure discharge lamp which suits a stabilizer with a small mercury-vapor lamp stabilizer etc. can be realized easily.

2 A pulse starter can be built in an inside of an outer tube about a pulse starter. A pulse starter is constituted considering a glow starter as a subject, and is connected in parallel to an arc tube. In a high-pressure discharge lamp of a metal halide lamp form, when enclosing a halogenide of a light-emitting metal, it is easy to mix the impurity H_2O which bars discharge. For this reason, compared with a mercury-vapor lamp, it is hard to start. Then, start up of a high-pressure discharge lamp becomes easy by building in a pulse starter.

[0034]Finally, an operation of this invention is explained. In this invention, since it is spread when visible light emitted from an arc tube by providing a fluorescent substance layer of predetermined composition passes a fluorescent substance layer, a metal halide lamp is constituted by spread type.

[0035]If ultraviolet rays generated by discharge in an arc tube penetrate an arc tube and irradiate with a fluorescent substance layer, a fluorescent substance will be excited and light will be emitted in visible light. Ultraviolet rays are included during luminescence from Sc of a light-emitting metal. When mercury is enclosed as buffer gas, a luminescent

line of ultraviolet rays occurs by discharge.
[0036]While luminescence from a fluorescent substance layer has a light emission peak in wavelength of 440-460 nm, 505-525 nm, and 585-605 nm, By being in a prescribed range which a peak ratio of radiant power mentioned above, total luminous flux of a high-pressure discharge lamp is almost equivalent to it in a transparent form which does not possess a fluorescent substance layer, or improves severalpercent more, for example.
[0037]A color temperature hardly changes as compared with it in a transparent form.
[0038]A chromaticity of luminescence approaches black body radiation from that of a transparent form which is not provided with a fluorescent substance layer by having a fluorescent substance layer of predetermined composition further again. For this reason, white light is acquired. However, there are quite few chromaticity deviations than it in the former.
[0039]Since most ultraviolet rays which penetrated an arc tube and were emitted in an outer tube further again irradiate with a fluorescent substance layer in an outer tube and it is efficiently changed into visible light, ultraviolet quantity which penetrates an outer tube and is emitted to the exterior decreases notably. As a result, irradiance of ultraviolet rays with a wavelength of 380 nm or less can be made small at 10 microwatt/cm ^{2}/1000 or less lx which is below half of conventional that. For this reason, even if it is a case where a metal halide lamp of this invention is used as an object for store lighting, for example, a problem by which goods are faded decreases.
[0040]On the other hand, in order to make it not produce ****** conventionally, glass which controls an ultraviolet-rays penetration of glass of lead etc. needed to be used for an outer tube. However, since glass of lead contains big lead of an environmental impact, there is a problem.
[0041]As for a metal halide lamp of an invention of claim 2, in the high-pressure discharge lamp according to claim 1, lamp power is less than 500W, and an arc tube is characterized by bulb wall loading being 16 - 30 W/cm^2.
[0042]In this invention, when lamp power is less than 500W, while lamp efficiency and color rendering properties are improved without influencing a life characteristic when bulb wall loading is the above-mentioned range, radiation of ultraviolet rays increases by discharge of a discharge medium. For this reason, excitation of a fluorescent substance layer prospers, an yield of visible light from a fluorescent substance layer increases, and total luminous flux of a high-pressure discharge lamp improves. Bulb wall loading is 17.5 - 22.5 W/cm^2 suitably.
[0043]If bulb wall loading is in the above-mentioned range, a small metal halide lamp of chromaticity difference can be obtained.
[0044]When lamp power is a range which are more than 500W - 1000W, bulb wall loading can be made into 7 - 20 W/cm^2. While being able to acquire luminous efficiency of the almost same visible light as the above-mentioned case even if bulb wall loading is suitably small since luminous efficiency of ultraviolet rays emitted in an arc tube will become high if it is the bulb wall loading of this range, a small metal halide lamp of chromaticity difference can be obtained. Bulb wall loading is 9 - 16 W/cm^2 suitably.
[0045]In the metal halide lamp according to claim 1 or 2, a metal halide lamp of an invention of claim 3 a fluorescent substance layer, When linear transmissivity before it is allocated by inner surface of an outer tube and linear transmissivity of an outer tube in an arranging position of a fluorescent substance layer allocates a fluorescent substance layer

is made into 100%, it is characterized by being 55 to 70%.
[0046]In this invention, when linear transmissivity of an outer tube of a part in which a fluorescent substance layer was formed is within the limits of the above, in comparison with a metal halide lamp of a transparent form, there is little change of a color temperature and a chromaticity. Linear transmissivity is 60 to 65% suitably.
[0047]In this invention, linear transmissivity shall be measured by the following measuring instruments and measurement procedures.
1. Light source for measurement appliance material (1) measurement : A12-16V12CP type miniature bulb (made by Toshiba Lighting & Technology Corp.)
(2) Measuring instrument : SPI-5 type rechargeable illuminometer (Made by Toshiba)
(3) Optical slit : a regulated power supply for slit (4) ramp-voltage adjustment or a variable resister (6) camera for voltage regulator (5) lamp-current adjustment provided with a circular opening 5 mm in diameter : Outer tube, An electric eye of a light source for measurement, an optical slit, and a measuring instrument is stored and measured in a camera in the state where it was set as a predetermined relation.
2. Setting out of a light source for measurement-procedure (1) measurement, a measuring instrument, and an optical slit : insert a light source for measurement, and an optical slit in an inside of an outer tube, and while irradiating with a part of a valve wall surface in which a measuring beam carries out a right opposite to an arc tube of an outer tube, make an electric eye of a measuring instrument close to an outside surface of the part of an outer tube concerned.
(2) Transmissometry of a transparent outer tube for comparison : except not allocating a fluorescent substance layer, prepare a transparent outer tube of the same specification as an outer tube under test as a transparent outer tube for comparison, and measure linear transmissivity of an outer tube for comparison beforehand. When measuring, a regulated power supply or a voltage regulator is adjusted, and voltage impressed to a light source for measurement is set as rated voltage. A variable resister for lamp current adjustment is adjusted, and lamp current of a light source for measurement is set up so that linear transmissivity of a transparent outer tube for comparison may be 100%.
(3) under test -- business -- under test [in which measurement: of linear transmissivity of an outer tube, next a fluorescent substance layer were allocated] -- business -- measure an outer tube. as a result, obtained linear transmissivity -- under test -- business -- it is a value of an outer tube.
[0048]In a metal halide lamp of any 1 statement of claims 1 thru/or 3, a metal halide lamp of an invention of claim 4 a fluorescent substance layer, The 1st fluorescent substance of europium, a manganese activation aluminate phosphor, and an europium activation halo phosphate fluorescent substance that makes a kind a subject at least, It is characterized by being constituted including the 2nd fluorescent substance that makes a subject an europium activation phosphoric acid vanadium acid yttrium fluorescent substance.
[0049]In this invention, while an emission peak wavelength has red system luminescence (R) which is blue system luminescence (B) which is 450 nm, green system luminescence (G) which is 515 nm, and 585-605 nm, A suitable fluorescent substance to set a peak ratio of radiant power of each color system luminescence to B:G:R=0.5-1.1:1.0-1.7:1.0 is specified.
[0050]The typical chemical formula of each fluorescent substance is as follows.
[0051]1 the 1st fluorescent substance:(1) europium and manganese activation aluminate

phosphor general formula; -- M1 was chosen from a group of Mg, Ca, Sr, Ba, Zn, Li, Rb, and Cs among a(M1) O-bAl_2O_3:Eu, Mn, however a formula -- a kind is shown at least. a and b are taken as a number with which it is satisfied of a> 0, b> 0, and 0.2 <=a/b<=1.5. (2) europium activation halo phosphate fluorescent substance general formula; -- M2 was chosen from a group of Mg, Ca, Sr, and Ba among M2 $_{10}(PO_4)_6$ and Cl_2:Eu, however a formula -- a kind is shown at least.

[0052]2 The 2nd fluorescent substance (1) europium activation phosphoric acid vanadium acid yttrium fluorescent substance general formula;$YPVO_4$:Eu3 the 1st fluorescent substance of a chromaticity, and the 2nd fluorescent substance, A compounding ratio shall be adjusted in 1:1 thru/or 2:1 both in quality and in quantity so that a chromaticity of a chromaticity coordinate in a fluorescent substance simple substance may be set to x0.29-0.36, and y0.29 - 0.31.

[0053]In this invention, the 1st fluorescent substance is $BaMgAl_{10}O_{17}$:Eu and (Ba, Mg) O and 6aluminum$_2O_3$:Eu, and Mn, and the 2nd fluorescent substance of combination with the 1st and 2nd preferred fluorescent substances is $YPVO_4$:Eu. Compounding ratios with the 1st preferred fluorescent substance are Mn pair $BaMgAl_{10}O_{17}$:Eu/(Ba, Mg) O and 6aluminum$_2O_3$:Eu, and Mn=1/1.5 (mass ratio). Ranges of a compounding ratio with the 1st and 2nd preferred fluorescent substances are (1st fluorescent substance)/(2nd fluorescent substance) =1 / 1 - 2/1 (mass ratio).

[0054]Then, in this invention, total luminous flux increases to a transparent form, an EQC, or a pan.

[0055]As for a metal halide lamp of an invention of claim 5, in a metal halide lamp of any 1 statement of claims 1 thru/or 4, a fluorescent substance layer is characterized by mean particle diameter of a fluorescent substance being 5 micrometers or less.

[0056]In this invention, total luminous flux becomes large from a case where mean particle diameter is over 5 micrometers, by specifying mean particle diameter of a fluorescent substance as above-mentioned. Mean particle diameter shall be based on a BET adsorption method.

[0057]A metal halide lamp of an invention of claim 6 is characterized by a fluorescent substance layer containing silica dioxide SiO_2 of 5 - 15 mass % in a metal halide lamp of any 1 statement of claims 1 thru/or 5.

[0058]This invention gives necessary binding capacity to a fluorescent substance layer by specifying a content ratio of silica dioxide SiO_2 added to a fluorescent substance layer as above-mentioned. It is become difficult to acquire necessary binding capacity that a content ratio of silica dioxide SiO_2 is less than 5 mass %. If 15 mass % is exceeded, reduction of total luminous flux will become easy to exceed tolerance level. It [in / in the above-mentioned content ratio of silica dioxide SiO_2 of this invention / this conventional seed metal halide lamp] showed that it was a suitable general range to a metal halide lamp specified to claims 1 thru/or 5 although it is many eyes. However, since both sufficient binding capacity and high total luminous flux will be obtained if a content ratio of silica dioxide SiO_2 is the range of 8 - 12 mass %, it is much more effective.

[0059]As for silica dioxide SiO_2, it is preferred that they are the particles of a range whose mean particle diameter is about 0.1-0.6 micrometer. Being added by fluorescent substance layer is preferred by mixing silica dioxide SiO_2 with a fluorescent substance as colloidal silica, adjusting fluorescent substance coating liquid, and applying, drying and calcinating this to an inner surface of an outer tube.

[0060]Then, according to this invention, a spread type metal halide lamp provided with a fluorescent substance layer which has necessary binding capacity, and cannot separate and fall easily can be obtained. [Embodiment of the Invention]Hereafter, an embodiment of the invention is described with reference to drawings.
[0061]Drawing 1 is a front view showing one embodiment of the metal halide lamp of this invention.
[0062]Drawing 2 is a front view showing the state where the fluorescent substance layer was similarly removed.
[0063]In each figure, the metal halide lamp MHL is provided with the arc tube 1, the outer tube 2, the fluorescent substance layer 3, the cap 4, the top supporting structure 5, the lower supporting structure 6, the connected conductors 7 and 8, and the pulse starter 9, and is constituted.
[0064]The arc tube 1 The translucency discharge container 1a, the main electrodes 1b and 1b of a couple, auxiliary-electrode 1bA, It has the discharge medium, the molybdenum foil 1c, the lead-in wire 1d, 1e, and 1f, and the insulation film 1g which are not illustrated, and as bulb wall loading shows drawing 4 according to the rated lamp power 400W thru/or 100W of a high-pressure discharge lamp, it is set as 17.5 - 22.5 W/cm^2.
[0065]Drawing 3 is a graph which shows the relation between the rated lamp power in one embodiment of the metal halide lamp of this invention, and bulb wall loading with it of a conventional example. In a figure, a horizontal axis shows rated lamp power (W), and a vertical axis shows bulb wall loading (W/cm^2), respectively. The straight line A shows this embodiment among a figure, and the straight line B shows a conventional example, respectively.
[0066]In this embodiment, bulb wall loading is relatively set up highly so that he can understand from a figure.
[0067]The translucency discharge container 1a closed the both ends of the quartz glass pipe, was constituted, and is provided with the discharge space part one a1 and the sealed part one a2 of a couple, and one a3. The sign one a4 is an exhaust air chip-off part. The sealed part one a2 is formed by the pinch sealing method so that it may become the lighting Nakagami side and the upper bed part of the discharge space part one a1 may make the shape of a hemisphere.
[0068]The main electrode 1b of the couple consisted of tungsten, and is provided with the axis one b1 and the coil one b2 looped around the tip part. And the end face of the axis one b1 is laid underground in the sealed part one a2 and one a3, respectively, and is welded to the molybdenum foil 1c. The molybdenum foil 1c is airtightly laid underground in the sealed part one a2 and one a3.
[0069]While consisting of tungsten wires and laying the end face underground in the sealed part one a2, auxiliary-electrode 1bA is welded to the molybdenum foil 1c1, and a tip is in the position which separated small distance to the main electrode 1b, and countered it.
[0070]A tip is welded to the molybdenum foil 1c, and 1 d of lead-in wire is drawn from the sealed part one a2 outside.
[0071]It is bent in the shape of [which has the leg of a parallel couple] a U character, a tip is welded for the leg of one of these to the molybdenum foil 1c, the leg of another side is laid underground in the sealed part one a3 as it is, and the lead-in wire 1e is caudad drawn from the sealed part one a3.

[0072]A tip is welded to the molybdenum foil 1c1, and 1 f of lead-in wire is drawn from the sealed part one a2 outside.
[0073]The insulation film 1g is applied to the outside surface of the part which is surrounding the circumference of the downward main electrode 1b in the figure of the translucency discharge container 1a.
[0074]A discharge medium consists of the halogenide, rare gas, and mercury of a light-emitting metal.
[0075]The outer tube 2 consists of hard glass, is making the shape of BT form of having the spindle-shaped bulged part 2a and the head 2c of short cylindrical shape [upper bed / lower end / neck part 2b and] in the center section, and seals and equips neck part 2b with the flare stem 2d. The flare stem 2d is implanting the anchor wire 2d3 while having introduced two airtightly in 1 or 2d with a lead-in wire of 2d of a couple.
[0076]The fluorescent substance layer 3 is formed in the inner surface of the whole outer-tube alumnus except neck part 2b of the outer tube 12 as shown in drawing 1.
[0077]It is E39 type cap, the cap 4 adhered to neck part 2b of the outer tube 2, 2d of lead-in-wire 1 or 2d one side two of a couple connects with a shell part, and another side has connected it to center contact, respectively.
[0078]The top supporting structure 5 is provided with the frame form conductor 5a, the metal band 5b, and the ribbon conductor 5c. The frame form conductor 5a consists of a conductive metal rod bent in the shape of a handstand U character, and is supported in the outer tube 2 by 2d of lead-in wire welding an upper edge part to 1 and the anchor wire 2d3. The metal band 5b is welded to the lower end of the biped part of the frame form conductor 5a while it supports the arc tube 1 upper part by supporting from under the sealed part one a2 of the arc tube 1. As for the ribbon conductor 5c, a end face is welded to the frame form conductor 5a, and the tip is welded to 1 d of lead-in wire of the arc tube 1. As for this, the molybdenum foil 1c, 1 d of lead-in wire, the ribbon conductor 5c, the frame form conductor 5a, and 2d of lead-in wire have connected the main electrode 1b of the arc tube 1 upper part to the shell part of the cap 4 via 1 in series.
[0079]It electrically connects with the lower electrode 1b, and the lower supporting structure 6 is provided with the frame form conductor 6a, the spring pieces 6b, the metal band 6c, 6d of ribbon conductors, and the gette 6e while it supports the lower part of the arc tube 1. The frame form conductor 6a is bent in the shape of a U character, and supports the lower part of the arc tube 1 in the outer tube 2. The center section of the couple is welded to the both sides of the lower part of the frame form conductor 6a, and the spring pieces 6b are fixing the frame form conductor 6a in the outer tube 2, when both ends weld by pressure to the inner surface of the head of the outer tube 2. The metal band 6c is welded to the frame form conductor 6a while it supports the arc tube 1 bottom by supporting from under the sealed part one a3 of the arc tube 1. 6 d of ribbon conductors have connected between the lead-in wire 1e of the frame form conductor 6a and the shape of a U character of the arc tube 1. The gette 6f defecates the inside of the outer tube 2, and the base material is welded to the frame form conductor 6a, and it is supported.
[0080]When it sees from the side, it is bent by inverse L-shaped, one side is welded [two] in 2d of lead-in wire, and in the outer tube 2, the connected conductors 7 are estranged with the top supporting structure 5, and are supported. On the other hand, the connected conductors 8 of another side consist of a lead with a thin path, an upper bed is welded the other neighborhoods of the connected conductors 7, and while middle curves and extends

along with the inner surface side of the outer tube 2, the lower end is welded to the frame form conductor 6a of the lower supporting structure 6. This has connected the main electrode 1b of the lower part of the arc tube 1 to the center contact of the cap 4 via the molybdenum foil 1c, the lead-in wire 1e, the frame form conductor 6a, the connected conductors 7 and 8, and the lead-in wire two a2 in series.

[0081]The pulse starter 9 collaborates with the stabilizer B which is provided with the glow starter 9a, the resistors 9b and 9c, the insulating child 9d, and the bimetal point of contact 9e, operates only at the time of start up, and is shown in drawing 4, and produces start pulse voltage and a photoelectric effect in the arc tube 1.

[0082]That is, the bimetal electrode of a couple estranges the glow starter 9a to the inside of a discharge container, it is sealed in it, and the discharge medium which makes argon an inside with a subject is enclosed. And external lead-in wire of one of these connected with the frame form conductor 5a of the top supporting structure 5, and the external lead-in wire of another side is the insulating child 9d, and has connected while to a lead.

[0083]Although the resistor 9b is not necessarily clearly shown in drawing 2, the lead of one of these connected with one side of the connected conductors 7, and the lead of another side has connected it to the bimetal point of contact 9e.

[0084]The lead of one of these connected with one support wire of the insulating child 9d, and the lead of another side has connected the resistor 9c to 1 f of lead-in wire connected to auxiliary-electrode 1bA via the molybdenum foil 1c1.

[0085]The insulating child 9d has the structure which stood the support wire erect to the both ends of the insulator.

[0086]The bimetal point of contact 9e is a normally closed type, and consists of the bi-metal plate nine e1 and the contact stick nine e2. The end face is welding the bi-metal plate nine e1 to the support wire of another side which is the insulating child 9d. The end face welds the contact stick nine e2 to the free end of the bi-metal plate nine e1, and a tip attaches and detaches to one support wire of the insulating child 9d according to displacement of the bi-metal plate nine e1. That is, the bimetal point of contact 9e collaborates with the insulating child 9d, and constitutes the contact mechanism while it is supported by the insulating child 9d.

[0087]Next, the pulse starter 9 provided with the above composition is explained with reference to drawing 4 from a viewpoint of an electric circuit.

[0088]Drawing 4 is a circuit diagram showing the light circuit of the electrical connection of the inside in one embodiment of the metal halide lamp of this invention, and the metal halide lamp of this invention.

[0089]In a figure, identical codes are attached about drawing 2 and identical parts, and explanation is omitted.

[0090]That is, the pulse starter 9 is connected with the arc tube 1 in parallel, if the whole is said at a word. If it says still in detail, the series circuit of the resistor 9b, the bimetal point of contact 9e, and the glow starter 9a is carrying out multiple connection to the arc tube 1. In a figure, the series circuit of the resistor 9b, the glow starter 9a, and the resistor 9d has connected between the downward main electrode 1b and auxiliary-electrode 1bA.

[0091]Light circuit OC is explained. Light circuit OC is constituted by making the switch SW and the stabilizer B intervene between AC-power-supply AS and the high-pressure discharge lamp HPL. That is, it is the composition which connects the input terminal of the stabilizer B to the two poles of rated voltage 200V commercial-alternating-current-

power AS via the electric power switch SW, and is connected via the lamp socket which does not illustrate an output terminal to the cap 4 of the metal halide lamp MHL.
[0092]The stabilizer B is constituted considering the inductor of a choke coil form as a subject, and rated voltage is 200V, it forms predetermined ramp voltage in the metal halide lamp MHL, and it is constituted so that the metal halide lamp MHL may be turned on stably.
[0093]Next, circuit operation is explained.
[0094]An injection of AC-power-supply AS will impress the secondary open circuit voltage of the stabilizer B to the metal halide lamp MHL. However, the metal halide lamp MHL cannot be put into operation only by this secondary open circuit voltage being impressed.
[0095]On the other hand, [in the glow starter 9a], a bimetal electrode is heated by generation of heat by glow discharge, and it is displaced, and contacts mutually soon, and the current restricted to the suitable value mainly by the resistor 9b flows into the stabilizer B. Next, the moment the bimetal inter-electrode of the couple dissociated by cooling, in the stabilizer B, the start pulse voltage generated with back electromotive force occurs, and the start pulse voltage is impressed between the downward main electrode 1b and auxiliary-electrode 1bS in drawing 2. As a result, auxiliary discharges occur first between the downward main electrode 1b and auxiliary-electrode 1bS, then it develops into the main stroke between the main electrode 1b and 1b, and the metal halide lamp MHL starts. The metal halide lamp MHL starts, and since the bimetal point of contact 9e will be heated by the radiant heat if the light is transferred and switched on to arc discharge, it is displaced, and dissociates and turns off from one lead of the resistor 9c. Thereby, since the glow starter 9a is wide opened to AC-power-supply AS, it does not re-operate. While being wide opened by OFF of the bimetal point of contact 9e, the series circuit of auxiliary-electrode 1bA, the resistor 9c, and the glow starter 9a becomes parallel relations to the lower main electrode 1b via discharge, but auxiliary-electrode 1bA. Since the resistance of the resistor 9c is high and the glow starter 9a does not re-operate, auxiliary-electrode 1bA maintains an opened condition. That is, auxiliary-electrode 1bA will not affect it during lighting.
[Work example 1]In the metal halide lamp shown in drawing 1 and drawing 2, it is as being shown below.
1 Metal halide lamp Rated lamp power: 400W arc tube : Shape; The upper part with a cylindrical shape, [Round shape,] the bottom -- V type inside diameter; -- 20mm inter electrode distance; -- 36mm bulb-wall-loading; -- 17.7 W/cm^2 discharge medium : a halogenide (ScI_3+NaI+NaBr=32mg). Rare gas (Ar6.7x10 ^{3}Pa) and Hg optimum dose . Fluorescent substance layer :$BaMgAl_{10}O_{17}$:Eu/(Ba, Mg) O and 6 $aluminum_2O_3$:Eu, Mn/$YPVO_4$:Eu/SiO_2=25/36/30/9 (all are mass %), Common [of a fluorescent substance] The diameter of an even-sized particle of 4 micrometers, the mean particle diameter of 0.3 micrometer of SiO_2, fluorescent substance layer Linear transmissivity 65%2 Stabilizer : Mercury-vapor lamp stabilizer drawing 5 for 400W, It is a graph which shows spectrum spectrum distribution with a wavelength of not less than 410 nm of luminescence of the fluorescent substance layer in Example 1 of the metal halide lamp of this invention. In a figure, a horizontal axis shows wavelength (nm) and a vertical axis shows radiant power (relative value), respectively. The blue light peak with a wavelength of 450 nm generated from the fluorescent substance layer 3, the green emission peak with

a wavelength of 515 nm, and the red light sub peak with a wavelength of 595 nm have appeared so that he can understand from a figure.
[0096]Spectrum spectrum distribution asked explanation of claim 1 for the fluorescent substance to be used by the method of the statement using the following equipment.
[0097]heat-resistant sample table: -- copper 20 mm in diameter, and 1-2 mm in depth -- spectroscope:Otsuka Electronics Co., Ltd. make MCPD-3000 type drawing 6 is a chromaticity diagram showing the chromaticity in Example 1 similarly at the product made from concave corps-ronds pen type mercury lamp:UVP INC. 11SC-1 type moment. In a figure, a horizontal axis shows the chromaticity x and a vertical axis shows the chromaticity y, respectively. The chromaticity of the high-pressure discharge lamp of a transparent form with same example and specification is shown, respectively except - sign being provided with the chromaticity of this example, and O sign not being provided with the fluorescent substance layer. B.B.L in a figure is a curve which shows the chromaticity of black body radiation.
[0098]While the chromaticity difference of this example over black body radiation is smaller than the time of not having the fluorescent substance layer so that he can understand from a figure, as for both chromaticity difference, in x, 0 and y are approaching extremely by 0.05. A difference is not accepted substantially [color temperature / K / about 4000].
[0099]Drawing 7 is a graph which shows ultraviolet area spectral distribution with a wavelength [in Example 1 of the metal halide lamp of this invention] of 280-380 nm. In a figure, a horizontal axis shows wavelength [nm] and a vertical axis shows relative power, respectively. The ultraviolet radiation illumination of Example 1 was 9.5 microwatt/cm ^{2} / 1000lx. Incidentally the ultraviolet radiation illumination of the conventional spread type metal halide lamp shown in drawing 18 by 22.3-microwatt[/cm] ^{2}/1000lx. As compared with it of a transparent form metal halide lamp which shows drawing 19 being 25.3 microwatt/cm ^{2} / 1000lx, according to this invention, it turns out that UV irradiation illumination becomes a very small value below half of conventional that so that still more clearly.
[Work example 2]Fluorescent substance layer :$BaMgAl_{10}O_{17}$:Eu/(Ba, Mg) O and 6aluminum$_2O_3$:Eu, Mn/$YPVO_4$:Eu/SiO_2=18/27/46/9 (all are mass %), Drawing 8 as Example 1 with same mean particle diameter of 4 micrometers of a fluorescent substance, mean particle diameter of 0.3 micrometer of SiO_2, and 65% of linear transmissivity others of a fluorescent substance layer is a chromaticity diagram showing the chromaticity in Example 2 of the metal halide lamp of this invention with it of a conventional example. In a figure, a horizontal axis shows the chromaticity x and a vertical axis shows the chromaticity y, respectively. The chromaticity of the metal halide lamp of a transparent form with an example and specification same except - sign being provided with the chromaticity of this example, and O sign not being provided with the fluorescent substance layer and a sign show the chromaticity of a transparent form, and the chromaticity of the conventional form with same ** sign, respectively. B.B.L in a figure is a curve which shows the chromaticity of black body radiation. A conventional example is the same specification as this example except a fluorescent substance layer being the composition of having explained in relation to drawing 16.
[0100]While the chromaticity difference over black body radiation is smaller than that of a transparent form, in this example, the chromaticity difference between both has

decreased, so that he can understand from a figure. A comparative example is the composition as this example with same fluorescent substance layer, although arc tube bulb wall loading is 14 W/cm^2.

[0101]In this example, the chromaticity difference over black body radiation has become less than that of a transparent form so that he can understand from a figure. A difference is not accepted substantially [color temperature / K / about 4250].

[0102]On the other hand, in transparent form (), although there is little change of chromaticity difference as compared with a conventional example (**), change of a color temperature is large.

[0103]Drawing 9 is a graph which shows the ramp voltage in Example 2 of the metal halide lamp of this invention, and the relation of total luminous flux with it of a transparent form. In a figure, a horizontal axis shows ramp voltage (V) and a vertical axis shows total luminous flux (lm), respectively. ** sign shows this example and ** sign shows a transparent form, respectively.

[0104]While the total luminous flux of this example is compared with a transparent form and is improving about 3%, there is little dispersion in the total luminous flux to ramp voltage, so that he can understand from a figure.

[Work example 3]

1 metal halide lamp halogenide rated lamp power: -- 1000W arc tube : shape; -- cylindrical shape (ScI_3+NaI = 68.6 mg) inside diameter; -- 25mm inter electrode distance; -- 100mm bulb-wall-loading; -- 12.7 W/cm^2 discharge medium : CsI = 0.8 mg, Rare gas (Ar1.3x10 ^{3}Pa). And Hg optimum dose Fluorescent substance layer : $BaMgAl_{10}O_{17}$:Eu/(Ba, Mg) O and 6 aluminum$_2O_3$:Eu, Mn/$YPVO_4$:Eu/SiO_2=25/36/30/9 (all are mass %), common [of a fluorescent substance] The diameter of an even-sized particle of 4 micrometers, Mean particle diameter of 0.3 micrometer2 of SiO_2 Stabilizer : Exclusive stabilizer drawing 10 for 1000W is a chromaticity diagram showing the chromaticity in Example 3 similarly. In a figure, a horizontal axis shows the chromaticity x and a vertical axis shows the chromaticity y, respectively. The chromaticity of the metal halide lamp of a transparent form with same this example and specification is shown, respectively except - sign being provided with the chromaticity of this example, and O sign not being provided with the fluorescent substance layer. B.B.L in a figure is a curve which shows the chromaticity of black body radiation.

[0105]According to this example, chromaticity difference with the black body radiation x is smaller than that of a transparent form so that he can understand from a figure. As for both color temperature, a difference is hardly accepted about by 4300-4400K.

[Work example 4]In the metal halide lamp shown in drawing 1 and drawing 2, it is as being shown below.

1 Metal halide lamp rated lamp power : 400W arc tube : Shape; The upper part with a cylindrical shape, [Round shape,] the bottom -- V type inside diameter; -- 20mm inter electrode distance; -- 36mm bulb-wall-loading; -- 17.7 W/cm^2 discharge medium : a halogenide (ScI_3+NaI+NaBr=32mg). Rare gas (Ar6.7x10 ^{3}Pa) and Hg optimum dose Fluorescent substance layer : $BaMgAl_{10}O_{17}$:Eu/$YPVO_4$:Eu /SiO_2=64/31/5 (all are mass %), Fluorescence The bodily mean particle diameter of 4 micrometers, mean particle diameter of 0.3 micrometer2 of SiO_2 Stabilizer : Mercury-vapor lamp stabilizer for 400W[Work example 5]Fluorescent substance layer 3 : 47/5 (all are mass %), an average of 4 micrometers of a fluorescent substance, and $BaMgAl_{10}O_{17}$:Eu/$YPVO_4$:Eu/SiO_2=47.5

/ mean-particle-diameter others of 0.3 micrometer of SiO_2 are the same as Example 1.
[Work example 6]
1 metal halide lamp halogenide rated lamp power: -- 1000W arc tube : shape; -- cylindrical shape (ScI_3+NaI = 68.6 mg) inside diameter; -- 25mm inter electrode distance; -- 100mm bulb-wall-loading; -- 12.7 W/cm^2 discharge medium : CsI = 0.8 mg, rare gas (Ar1.3x10 ^{3}Pa), and Hg optimum dose Fluorescent substance layer : $BaMgAl_{10}O_{17}$:Eu/$YPVO_4$:Eu /SiO_2=64/31/5 (all are mass %), mean particle diameter of 4 micrometers of a fluorescent substance, Mean particle diameter of 0.3 micrometer2 of SiO_2 Stabilizer : Exclusive stabilizer drawing 11 for 1000W is a graph which shows the ramp voltage in Example 3 of the metal halide lamp of this invention, and the relation of total luminous flux with it of a transparent form. In a figure, a horizontal axis shows ramp voltage (V) and a vertical axis shows total luminous flux (lm), respectively. - sign shows this example and O sign shows a transparent form, respectively.
[0106]While there is less dispersion in the total luminous flux to ramp voltage than that of a transparent form, according to this example, a total-luminous-flux value is almost equivalent so that he can understand from a figure.
[0107]Drawing 12 is a graph which shows the relation of the total luminous flux to the rate of a compounding ratio of the fluorescent substance in one embodiment of the metal halide lamp of this invention. A vertical axis shows a total-luminous-flux value (lm).
[0108]Drawing 13 is a graph which similarly shows the relation of the general color rendering index to the rate of a compounding ratio of a fluorescent substance. A vertical axis shows general-color-rendering-index Ra.
[0109]Drawing 14 is a graph which similarly shows the relation of the correlated color temperature to the rate of a compounding ratio of a fluorescent substance. A vertical axis shows correlated-color-temperature Tc (K).
[0110]Drawing 15 is a graph which similarly shows the relation of the chromaticity difference over the rate of a compounding ratio of a fluorescent substance. A vertical axis shows chromaticity difference duv.
[0111]As mentioned above, in drawing 12 thru/or drawing 15 the rate of a BGr compounding ratio of a horizontal axis (%), The compounding ratio of fluorescent substance $BaMgAl_{10}O_{17}$:Eu and (Ba, Mg) O and 6aluminum$_2O_3$:Eu, and Mn (henceforth "BGr") which perform blue-green luminescence to the whole fluorescent substance is shown. Therefore, the numerical value which subtracted the ratio of the above-mentioned fluorescent substance from 100% shows the ratio of $YPVO_4$:Eu (henceforth "Re"). ** sign shows the case of BGr:Re=1:3.
[0112]In the case of BGr:Re=1:1 and BGr:Re=2:1, total luminous flux shows the high tendency more relatively than the case of BGr:Re=1:3 so that he can understand from each figure. In [any] a compounding ratio, general-color-rendering-index Ra is almost equivalent. In the case of BGr:Re=1:1 and BGr:Re=2:1, correlated-color-temperature Tc shows the tendency somewhat higher than the case of BGr:Re=1:3. In the case of BGr:Re=1:1, there is more chromaticity difference duv. somewhat, but in the case of BGr:Re=2:1, it decreases.
[0113]
[Effect of the Invention]The arc tube provided with Na which was enclosed in the electrode of the couple sealed in the translucency discharge container and the translucency discharge container, and the translucency discharge container according to

each invention of claims 1 thru/or 5, and the discharge medium containing Sc, While it is allocated inside an outer tube and an outer tube and an emission peak wavelength has red system luminescence (R) which is blue system luminescence (B) which is 440-460 nm, green system luminescence (G) which is 505-525 nm, and 585-605 nm, respectively, While total luminous flux is almost equivalent to it in the transparent form which does not possess a fluorescent substance layer or improves more than it by providing the fluorescent substance layer with which the peak ratio of the radiant power of each color system luminescence is satisfied of a lower type, While a color temperature hardly changes as compared with it in a transparent form, a spread type metal halide lamp with few amounts of ultraviolet radiation can be provided.

[0114]B: According to the invention of 0.5 to 1.1:1.0 to 1.7:G:R=1.0 claim 2, in addition, lamp power by less than 500W. While radiation of the ultraviolet rays which irradiate with a fluorescent substance layer when bulb wall loading is 16 - 30 W/cm^2 increases and luminescence from a fluorescent substance increases, a spread type metal halide lamp with little chromaticity difference can be provided.

[0115]When linear transmissivity before the fluorescent substance layer is allocated by the inner surface of the outer tube in addition and the linear transmissivity of the outer tube in the arranging position of a fluorescent substance layer allocates a fluorescent substance layer is made into 100% according to the invention of claim 3, By being 55 to 70%, a spread type metal halide lamp with little change of a color temperature and a chromaticity can be provided in comparison with the high-pressure discharge lamp of a transparent form.

[0116]According to the invention of claim 4, in addition, a fluorescent substance layer The 1st fluorescent substance of europium, a manganese activation aluminate phosphor, and an europium activation halo phosphate fluorescent substance that makes a kind a subject at least, By being constituted including the 2nd fluorescent substance that makes a subject an europium activation phosphoric acid vanadium acid yttrium fluorescent substance, the spread type high-pressure discharge lamp whose total luminous flux improves from a transparent form can be provided.

[0117]According to the invention of claim 5, in addition, the fluorescent substance layer can provide a spread type metal halide lamp with large total luminous flux, when the mean particle diameter of a fluorescent substance is 5 micrometers or less.

[0118]According to the invention of claim 6, when the fluorescent substance layer, in addition, contains silica dioxide SiO_2 of 5 - 15 mass %, the spread type metal halide lamp provided with the fluorescent substance layer which has necessary binding capacity, and cannot separate and fall easily can be provided.

CLAIMS

[Claim(s)]
[Claim 1]being sealed in a translucency discharge container in which discharge space is formed in an inside, and a translucency discharge container -- the inside of discharge space of a translucency discharge container -- ******** -- even if small -- an electrode of a couple. And it is allocated including a halogenide of Na and Sc in an arc tube provided with a discharge medium enclosed in a translucency discharge container, an outer tube which stores; arc tube, and; outer tube at least, While an emission peak wavelength has red system luminescence (R) which is blue system luminescence (B) which is 440-460 nm, green system luminescence (G) which is 505-525 nm, and 585-605 nm, respectively, A metal halide lamp possessing a fluorescent substance layer with which a peak ratio of radiant power of each color system luminescence is satisfied of a lower type, and;.
B: G:R=0.5-1.1:1.0-1.7:1.0 [Claim 2]The metal halide lamp according to claim 1 with which an arc tube is characterized by lamp power's being less than 500W, and bulb wall loading being 16 - 30 W/cm^2.
[Claim 3]The metal halide lamp according to claim 1 or 2 when a fluorescent substance layer is made [linear transmissivity before it is allocated by inner surface of an outer tube and linear transmissivity of an outer tube in an arranging position of a fluorescent substance layer allocates a fluorescent substance layer] into 100%, wherein it is 55 to 70%.
[Claim 4]A fluorescent substance layer The 1st fluorescent substance of europium, a manganese activation aluminate phosphor, and an europium activation halo phosphate fluorescent substance that makes a kind a subject at least, A metal halide lamp of any 1 statement of claims 1 thru/or 3 constituting including the 2nd fluorescent substance that makes a subject an europium activation phosphoric acid vanadium acid yttrium fluorescent substance.
[Claim 5]A metal halide lamp of any 1 statement of claims 1 thru/or 4 for which a fluorescent substance layer is characterized by mean particle diameter of a fluorescent substance being 5 micrometers or less.
[Claim 6]A metal halide lamp of any 1 statement of claims 1 thru/or 5, wherein a fluorescent substance layer contains silica dioxide SiO_2 of 5 - 15 mass %.

[Translation done.]